ACOM T.O.P. 3.0

DICOM Conformance Statement for Offline Media

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1 Introduction

1.1 Purpose

This DICOM Conformance Statement (DCS) is written according to part PS 3.2 of [1].

The applications described in this conformance statement are the Siemens implementation of the Basic Cardiac X-Ray Application Profile [2] and the Dynamic Cardio Review Augmented Application Profile [3] within the ACOM T.O.P. product installed with software version 3.0 or later. The ACOM T.O.P. DICOM offline media storage class service implementation acts as FSC, FSU, and FSR for the special application profiles and the related SOP Class instances.

1.2 Definitions, Acronyms, and Abbreviations

ACOM	A cardiac review station developed and sold by Siemens Medical Systems in the following configurations: ACOM.M version 3.0 and ACOM.B version 3.0.
ACOM.M	An ACOM that supports FSR (CD disc read), FSC (CD disc create), and FSU (CD disc update).
ACOM.B	An ACOM that supports only FSR (CD disc read).
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
NEMA	National Electrical Manufacturers Association

1.3 References

[1] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-12

[2] Basic Cardiac X-Ray Application Profile, Annex B, NEMA PS 3.11, 1998

[3] Dynamic Cardio Review Augmented Application Profile, Version 1.1, July 7, 1995

[4] Dynamic Cardio Review - Extension to the X-Ray Angiographic Image Object and Media Storage, Version 1.1, July 7, 1995

Note: Documents [3] and [4] were developed jointly by Siemens Medical Systems, Inc. and Philips Medical Systems, Nederland B.V.. They are available upon request.

1.4 Connectivity and Interoperability

The implementation of the Siemens DICOM interface has been carefully tested to assure correspondence with this Conformance Statement. But the Conformance Statement and the DICOM standard do not guarantee interoperability of the Siemens modalities and modalities of other vendors. The user must compare the relevant Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required. A network environment may need additional functions out of the scope of DICOM.

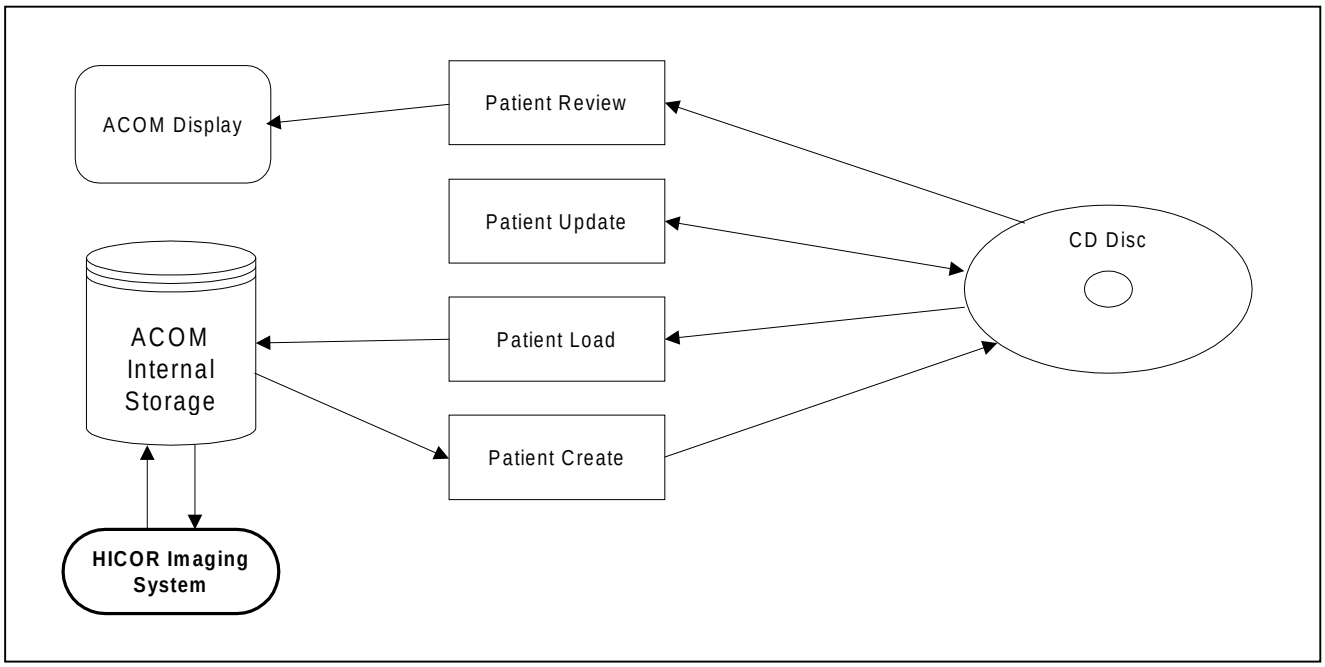
2 Implementation Model

The ACOM provides patient review from CD disc, patient load from CD, creation of a patient on CD disc, and the updating of a patient on CD disc. ACOM also serves as the CD archival component for HICOR Imaging Systems. The interface between ACOM and HICOR is private.

The ACOM T.O.P. DICOM CD Disc Application provides creation (FSC) and update (FSU) of DICOM CD offline media according to the Dynamic Cardio Review Augmented Application Profile. For CD offline media written by a Siemens Polytron T.O.P. or ACOM T.O.P. only, according to the above profiles, the FSR and FSU role is supported for import and update of the related SOP instances respectively.

2.1 Application Data Flow Diagram

The ACOM T.O.P. DICOM CD Disc Application will serve as an interface to the CD-R offline medium device. It provides interfaces for the Real World Activities of Patient Review, Patient Update, Patient Load, and Patient Create.



The DICOM CD Disc Application will support the 120mm CD-R medium.

2.2 Functional Definition of Application Entities

The ACOM can perform the following functions:

Patient Review (direct from CD):
Upon inserting a CD disc into the ACOM, a directory is provided that contains all of the images associated with the patient on the disc that conforms to the Basic Cardiac X-Ray Application Profile. Any image within the directory can be selected for direct review from the CD disc.

Patient Update:
During Patient Review from disc, the CD disc can be updated with any changes made to the patient's demographic information and/or addition of or modification to reports.

Patient Load (from CD):
Upon inserting a DICOM compliant CD disc in the ACOM, any patient meeting the profile requirements of this specification can be loaded into the internal ACOM storage.

Patient Create:
Upon inserting a CD disc into the ACOM, a directory of ACOM patients is provided. Selecting a patient from the directory will create (barring enough space on the CD) a CD disc containing the patient's demographic and image data.

Patient data can be transferred to/from ACOM's internal storage and the HICOR Imaging System via a private interface (not described in this document). As such, the directory of ACOM patients may contain patients transferred from HICOR. ACOM is the primary CD archival component for HICOR. ACOM can be configured to automatically archive to CD patient data received from HICOR.

2.3 Sequencing Requirements

The ACOM requires the following sequencing:

Patient Review: None.

Patient Update: The Patient Update must be performed prior to ejecting a CD disc if during Patient Review: (1) the demographic information for the CD patient has been modified, (2) reports have been added to the CD, or (3) reports on the CD have been modified.

Patient Load: The Patient Load operation is available after the CD disc containing a patient whose data conforms to the Basic Cardiac X-Ray Application Profile is inserted into the ACOM.

Patient Create: The Patient Create operation is available after a CD disc is inserted into the ACOM. Archival to CD of patient data on HICOR first requires transfer to ACOM prior to the Patient Create operation becoming available (for that HICOR patient).

2.4 File Meta Information Options (see PS 3.10)

The Implementation Class UID is: **1.3.12.2.1107.5.4.3.2**

The Source Application Entity Title of: "**SIEMENS:DCR 3.0**" is used. The "3.0" represents the current ACOM software phase (Siemens proprietary).

3 AE Specifications

3.1 CD Disc Application Specification

The ACOM CD Disc Application provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed in Table 3.1-1

Table 3.1-1 Application Profiles, Activities, and Roles for the ACOM CD Disc

Application Profiles Supported	Real World Activity	Role	SC Option
STD-XABC-CD AUG-XABC-DYNAMIC-CD	Patient Review	FSR	Interchange
	Patient Update	FSU	*Proprietary
	Patient Load	FSR	Interchange
	Patient Create	FSC FSU	Interchange

* Proprietary is used to indicate the Real World Activity is only supported for Siemens offline media.

3.1.1 File Meta Information for the Application Entity

A Source Application Entity Title of "SIEMENS:DCR 3.0" is used when writing a CD disc as part of a Patient Create or Patient Update operation. The "*3.0*" represents the current version number (Siemens proprietary).

3.1.2 Real-World Activities for this Application Entity

3.1.2.1 Real-World Activity: Patient Review

The ACOM CD Disc Application acts as a FSR using the Interchange option when reviewing a patient's images from the CD disc. This is always done when a disc with an existing file-set is inserted. As a consequence, media removal will clear the CD patient(s) from the Patient Directory multi-map display.

The ACOM CD Disc Application presents only those images on the CD disc that contain 512 x 512 x 8 bit frames formatted to the Basic Cardiac X-Ray Application Profile (SDT-XABC-CD).

3.1.2.1.1 Application Profiles for Patient Review

Basic Cardiac X-Ray Application Profile (STD-XABC-CD):

If the data on the CD disc also conforms to the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD), then the images can be reviewed directly from the CD disc at or near acquisition rates.

If the patient data on the CD disc only conforms to the Basic Cardiac X-Ray Application Profile, then the first pass review rate for each image will be limited to approximately 5 frames/second.

3.1.2.2 Real-World Activity: Patient Update

The ACOM CD Disc Application acts a FSU using the Proprietary option when updating a patient's demographic information on the CD disc.

When reviewing patient data from a CD disc originally created by the Patient Create operation, any changes to the patient's demographic information can be updated on the CD disc using the Patient Update operation.

Note: In addition to patient's demographic information, the Patient Update operation also updates other private patient related information. A description of the private information is beyond the scope of this document.

3.1.2.2.1 Application Profiles for Patient Update

Only CD discs created by ACOM's Patient Create operation can be updated by Patient Update. All such CD discs contain both the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD).

Note: ACOM.Report and ACOM.Rec will also be capable of creating/updating ACOM CD's that ACOM will be able to update. This new functionality is beyond the scope of this document.

3.1.2.3 Real-World Activity: Patient Load

The ACOM CD Disc Application acts a FSR using the Interchange option when loading a patient from CD disc.

Any CD disc containing patient demographic and image data conforming to the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (XABC-DYNAMIC-CD) can be loaded into the internal ACOM storage.

3.1.2.3.1 Application Profiles for Patient Load

The ACOM CD Disc Application loads only those images from the patient on the CD disc that contain 512 x 512 x 8 bit frames conforming to the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD).

3.1.2.4 Real-World Activity: Patient Create

The ACOM CD Disc Application acts as a FSC using the Interchange option when writing patient data to CD disc.

The ACOM CD Disc Application can write patient data to either a blank or nonblank CD. When appending patient data to a nonblank CD, the ACOM CD Disc Application acts as a FSU when updating the CD's DICOM directory.

3.12.4.1 Application Profiles for Patient Create

Patient Create can write to either a blank disc or non-blank disc. All CD discs created by the Patient Create operation conform to both the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD).

For patient data transferred from HICOR to ACOM for archival to CD, the contents of the stored image objects is determined by HICOR and only some attributes can be modified/corrected by ACOM prior to Patient Create.

4 Augmented and Private Profiles

4.1 Augmented Profiles

As a FSR, the ACOM CD Disc Application can read CD discs that conform to just the Basic Cardiac X-Ray Application Profile (STD-XABC-CD), or to both the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD).

4.1.1 AUG-XABC-DYNAMIC-CD Application Profile

As a FSC and a FSU, the ACOM CD Disc Application creates and updates discs that conform to both the Basic Cardiac X-Ray Application Profile (STD-XABC-CD) and the Dynamic Cardio Review Augmented Application Profile (AUG-XABC-DYNAMIC-CD).

4.1.1.1 SOP Class Augmentations

The following SOP Classes and related Transfer Syntaxes are added by this augmentation:

Table 4.1-1 AUG-XABC-DYNAMIC-CD SOP Classes and Transfer Syntax additions

SOP Class Name	Media Storage SOP Class UID [0002,0002]	Transfer Syntax Definition	Transfer Syntax UID [0002,0010]
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG Baseline (Process 1);Lossy JPEG 8-bit image compression	1.2.840.10008.1.2.4.50

4.1.1.2 Directory Augmentations

The Dynamic Cardio Review Augmented Application Profile utilizes the same requirements for the Directory Information in the DICOMDIR as the STD-XABC-CD Application Profile with the addition that lossy compressed images shall be identified by Directory Records of type PRIVATE.

DICOMDIR Records of type IMAGE and PRIVATE (Lossy Image) and Lossy and Lossless Image Data contain, in addition to the keys required by the STD-XABC-CD Application Profile, the keys specified in the following table:

Table 4.1-2 Additional Attributes for AUG-XABC-DYNAMIC-CD

Key Attribute	Tag	Directory Record Type	Type	Notes
Image Sequence Number	[0021,xx13]	Lossy and Lossless Image Data (Private)	3	The sequence number of this image in the Study, as stored on the medium.
Alternate Image Sequence	[0009,xx40]	DICOMDIR (IMAGE keys)	1C	Required if the associated Lossy Directory Record exists.
Source Image Sequence	[0008,2112]	DICOMDIR (PRIVATE (Lossy Image)) and Lossy Image Data (Private)	1	Identifies the lossless compressed image.
Icon Image Sequence	[0088,0200]	DICOMDIR (IMAGE keys)	1	N/A

The Lossy Directory Record has a Private Record UID [0004,1432] of 1.3.46.670589.7.1.1.3
Please refer to Appendix A for more information.

4.1.1.3 Other Augmentations

None

4.2 Private Profiles

None

5 Extension, Specializations, Privatizations of SOP Classes and Transfer Syntaxes

ACOM utilizes the SOP class extension [4] created to support the Dynamic Cardio Review Augmented Application Profile.

The list of supported attributes for the SOP Classes according to the Standard Application Profiles can be found in the Appendix, Table A-1.

6 Configuration

The ACOM product is sold in two configurations, the ACOM.M and the ACOM.B. The ACOM.M supports FSR, FSC, and FSU operations. The ACOM.B supports only FSR operations.

7 Character Sets

The ACOM CD Disc Application supports the use of Latin 1 character set (Specific Character Set = “ISO_IR 100”).

A1 Appendix: Supported Attributes

Note: <no data entered by ACOM> indicates data is always zero length.

A1.1 DICOMDIR

Attribute Name	Tag	Value
Group Length	0002,0000	
File Meta Information Version	0002,0001	
Media Storage SOP Class UID	0002,0002	1.2.840.10008.1.3.10 (Media Storage Directory Storage)
Media Storage SOP Instance UID	0002,0003	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Transfer Syntax UID	0002,0010	1.2.840.10008.1.2.1 (Explicit VR Little Endian)
Implementation Class UID	0002,0012	1.3.12.2.1107.5.4.3.2
Source Application Entity Title	0002,0016	SIEMENS:DCR 3.0
File-set ID	0004,1130	SMS_DYNAMIC_CARD
Offset of the First Directory Record of the Root Directory Entity	0004,1200	
Offset of the Last Directory Record of the Root Directory Entity	0004,1202	
File-set Consistency Flag	0004,1212	0
Directory Record Sequence	0004,1220	Sequence Items
> Offset of the Next Directory Record	0004,1400	
> Record In-use flag	0004,1410	
> Offset of Referenced Lower-Level Directory Entity	0004,1420	
> Directory Record Type	0004,1430	PATIENT, STUDY, SERIES, IMAGE, PRIVATE
PATIENT KEYS		
Referenced File ID	0004,1500	<only if Detached Patient Management file exists>
Referenced SOP Class UID in File	0004,1510	1.2.840.10008.3.1.2.1.1 (Detached Patient Management SOP Class)
Referenced SOP Instance UID in File	0004,1511	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Specific Character Set	0008,0005	ISO_IR 100
Patient's Name	0010,0010	
Patient ID	0010,0020	
Patient's Birth Date	0010,0030	<yyyymmdd>
Patient's Sex	0010,0040	<"M", "F", or "O">
Patient's Size	0010,1020	
Patient's Weight	0010,1030	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

STUDY KEYS		
Specific Character Set	0008,0005	ISO_IR 100
Study Date	0008,0020	<yyyymmdd>
Study Time	0008,0030	<hhmmss>
Accession Number	0008,0050	
Referring Physician's Name	0008,0090	<no data entered by ACOM>
Study Description	0008,1030	
Private Creator Data Element	0009,0010	CARDIO-SMS 1.0
Private Data	0009,1008	
Private Data	0009,1009	
Study Instance UID	0020,000d	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study ID	0020,0010	
SERIES KEYS		
Specific Character Set	0008,0005	ISO_IR 100
Modality	0008,0060	XA
Institution Name	0008,0080	
Institution Address	0008,0081	<no data entered by ACOM>
Performing Physician’s Name	0008,1050	
Series Instance UID	0020,000e	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Series Number	0020,0011	1
PRIVATE (Lossy Image)		
Private Record UID	0004,1432	1.3.46.670589.7.1.1.3
Referenced File ID	0004,1500	
Referenced SOP Class UID in File	0004,1510	1.2.840.10008.5.1.4.1.1.12.1
Referenced SOP Instance UID in File	0004,1511	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Referenced Transfer Syntax UID in File	0004,1512	1.2.840.10008.1.2.4.50 (JPEG Lossy)
Image Type	0008,0008	DERIVED\PRIMARY\SINGLE PLANE or DERIVED\PRIMARY\SINGLE PLANE\SINGLE A or DERIVED\PRIMARY\SINGLE PLANE\SINGLE B or DERIVED\PRIMARY\BIPLANE A or DERIVED\PRIMARY\BIPLANE B
Referenced Image Sequence	0008,1140	Sequence Items (Only if Image Type = BIPLANE A or BIPLANE B)
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Source Image Sequence	0008,2112	Sequence Items (Identifies the lossless compressed image)

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Frame Time	0018,1063	(ms)
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Image Number	0020,0013	<scene number>
Number of Frames	0028,0008	<actual number of frames>
Calibration Image	0050,0004	<no data entered by ACOM>
IMAGE KEYS		
Reference File ID	0004,1500	
Referenced SOP Class UID in File	0004,1510	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
Referenced SOP Instance UID in File	0004,1511	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Referenced Transfer Syntax UID in File	0004,1512	1.2.840.10008.1.2.4.70 (JPEG Lossless)
Image Type	0008,0008	ORIGINAL\PRIMARY\SINGLE PLANE or ORIGINAL\PRIMARY\SINGLE PLANE\SINGLE A or ORIGINAL\PRIMARY\SINGLE PLANE\SINGLE B or ORIGINAL\PRIMARY\BIPLANE A or ORIGINAL\PRIMARY\BIPLANE B
Referenced Image Sequence	0008,1140	Sequence Items (Only if Image Type = BIPLANE A or BIPLANE B)
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Private Creator Data Element	0009,0010	CARDIO-D.R. 1.0
Alternate Image Sequence	0009,1040	Sequence Items (Only if Dynamic (lossy) Image is present)
> Item	fffe,e000	Item Elements
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
> Item Delimitation Item	fffe,e00d	
Frame Time	0018,1063	(ms)
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Image Number	0020,0013	<scene number>
Number of Frames	0028,0008	<actual number of frames>
Calibration Image	0050,0004	<no data entered by ACOM>
Icon Image Sequence	0088,0200	Sequence Items

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

> Item	fffe,e000	Item Elements
> Samples per Pixel	0028,0002	1
> Photometric Interpretation	0028,0004	MONOCHROME2
> Rows	0028,0010	128
> Columns	0028,0011	128
> Bits Allocated	0028,0100	8
> Bits Stored	0028,0101	8
> High Bit	0028,0102	7
> Pixel Representation	0028,0103	0
> Pixel Data	7fe0,0010	
> Item Delimitation Item	fffe,e00d	
PRIVATE (Reports)		
Private Record UID	0004,1432	1.3.12.2.1107.5.4.3.1
Referenced File ID	0004,1500	
Referenced SOP Class UID in File	0004,1510	1.2.840.10008.5.1.4.1.1.12.1
Referenced SOP Instance UID in File	0004,1511	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Referenced Transfer Syntax UID in File	0004,1512	1.2.840.10008.1.2.4.70 (JPEG Lossless)
Image Type	0008,0008	DERIVED\PRIMARY\SINGLE PLANE or DERIVED\PRIMARY\SINGLE PLANE\SINGLE A or DERIVED\PRIMARY\SINGLE PLANE\SINGLE B or DERIVED\PRIMARY\BIPLANE A or DERIVED\PRIMARY\BIPLANE B
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Image Number	0020,0013	<scene number>
Number of Frames	0028,0008	<actual number of frames>
Calibration Image	0050,0004	<no data entered by ACOM>

Note: SOP Instance UIDs beginning with:

- 1.3.12.2.1107.5.4.1 indicates creation on Polytron
- 1.3.12.2.1107.5.4.2 indicates creation on HICOR
- 1.3.12.2.1107.5.4.3 indicates creation on ACOM

Note: <system_id> denotes unique system identification number. On HICOR, the <system_id> is configurable. On ACOM, the <system_id> is generated from the CCP board.

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

A1.2 Detached Patient Management

Attribute Name	Tag	Value
Group Length	0002,0000	
File Meta Information Version	0002,0001	
Media Storage SOP Class UID	0002,0002	1.2.840.10008.3.1.2.1.1 (Detached Pat. Mgmt. SOP Class)
Media Storage SOP Instance UID	0002,0003	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Transfer Syntax UID	0002,0010	1.2.840.10008.1.2.1 (Explicit VR Little Endian)
Implementation Class UID	0002,0012	1.3.12.2.1107.5.4.3.2
Source Application Entity Title	0002,0016	SIEMENS:DCR 3.0
Specific Character Set	0008,0005	ISO_IR 100
SOP Class UID	0008/0016	1.2.840.10008.3.1.2.1.1 (Detached Pat. Mgmt. SOP Class)
SOP Instance UID	0008,0018	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study Date	0008,0020	<yyyymmdd>
Study Time	0008,0030	<hhmmss>
Accession Number	0008,0050	<max. 16 char>
Modality	0008,0060	XA
Institution Name	0008,0080	<max. 64 char>
Institution Address	0008,0081	<no data entered by ACOM>
Referring Physician’s Name	0008,0090	<no data entered by ACOM>
Study Description	0008,1030	<max. 64 char>
Performing Physician’s Name	0008,1050	<max. 64 char, "^" delimiter>
Private Creator Data Element	0009,0010	CARDIO-SMS 1.0
Private Data 1	0009,1002	
Private Data 2	0009,100a	
Patient’s Name	0010,0010	<max. 64 char, "^" delimiter>
Patient ID	0010,0020	<max. 64 char>
Patient's Birth Date	0010,0030	<yyyymmdd>
Patient’s Sex	0010,0040	<"M", "F", or "O">
Patient's Size	0010,0040	
Patient's Weight	0010,1020	
Study Instance UID	0020,000D	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Series Instance UID	0020,000E	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study ID	0020,0010	<max. 16 char>
Series Number	0020,0011	1

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

A1.3 Lossy Image Data

Attribute Name	Tag	Value
Group Length	0002,0000	
File Meta Information Version	0002,0001	
Media Storage SOP Class UID	0002,0002	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
Media Storage SOP Instance UID	0002,0003	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Transfer Syntax ID	0002,0010	1.2.840.10008.1.2.4.50 (JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression)
Implementation Class UID	0002,0012	1.3.12.2.1107.5.4.3.2
Source Application Entity Title	0002,0016	SIEMENS:DCR 3.0
Specific Character Set	0008,0005	ISO_IR 100
Image Type	0008,0008	DERIVED\PRIMARY\SINGLE PLANE or DERIVED\PRIMARY\SINGLE PLANE\SINGLE A or DERIVED\PRIMARY\SINGLE PLANE\SINGLE B or DERIVED\PRIMARY\BIPLANE A or DERIVED\PRIMARY\BIPLANE B
SOP Class UID	0008,0016	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
SOP Instance UID	0008,0018	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study Date	0008,0020	<yyyymmdd>
Image Date	0008,0023	<yyyymmdd>
Study Time	0008,0030	<hhmmss>
Image Time	0008,0033	<hhmmss>
Accession Number	0008,0050	<max. 16 char>
Modality	0008,0060	XA
Manufacturer	0008,0070	SIEMENS
Institution Name	0008,0080	<max. 64 char>
Institution Address	0008,0081	<no data entered by ACOM>
Referring Physician’s Name	0008,0090	<no data entered by ACOM>
Study Description	0008,1030	<max. 64 char>
Performing Physician’s Name	0008,1050	<max. 64 char, "^" delimiter>
Manufacturer's Model Name	0008,1090	HICOR/ACOM-TOP
Reference Image Sequence	0008,1140	Sequence Items (if Image Type is BIPLANE A or BIPLANE B)
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Source Image Sequence	0008,2112	Sequence Items (Identifies the lossless compressed image)
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Private Creator Data Element	0009,0010	CARDIO-SMS 1.0
Private Data	0009,1002	
Private Data	0009,1003	
Private Data	0009,100a	
Private Data	0009,100b	
Patient's Name	0010,0010	<max. 64 char, "^" delimiter>
Patient ID	0010,0020	<max. 64 char>
Patient's Birth Date	0010,0030	<yyyymmdd>
Patient's Sex	0010,0040	<"M", "F", or "O">
Patient's Size	0010,1020	
Patient's Weight	0010,1030	
KVP	0018,0060	<no data entered by ACOM>
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	(e.g., VA30F 2000-11-05 21:00:31)
Frame Time	0018,1063	(ms)
Exposure	0018,1152	<no data entered by ACOM> (mAs)
Radiation Setting	0018,1155	GR
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Private Creator Data Element	0019,0010	CARDIO-D.R. 1.0
Private Data	0019,1030	
Study Instance UID	0020,000D	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Series Instance UID	0020,000E	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study ID	0020,0010	<max. 16 char>
Series Number	0020,0011	1
Image Number	0020,0013	<scene number>
Patient Orientation	0020,0020	<no data entered by ACOM>
Image Comment	0020,4000	<scene name>
Private Creator Data Element	0021,0010	CARDIO-D.R. 1.0
Private Data	0021,1013	<Image Sequence Number in the study, as stored on the medium>
Samples Per Pixel	0028,0002	1
Photometric Interpretation	0028,0004	MONOCHROME2
Number of Frames	0028,0008	<actual number of frames>
Frame Increment Pointer	0028,0009	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Rows	0028,0010	512
Columns	0028,0011	512
Bits Allocated	0028,0100	8
Bits Stored	0028,0101	8
High Bit	0028,0102	7
Pixel Representation	0028,0103	0
Pixel Intensity Relationship	0028,1040	LIN or LOG
Window Center	0028,1050	<if native image>
Window Width	0028,1051	<if native image>
Recommended Viewing Mode	0028,1090	NAT (if native image) or SUB (if subtracted image)
Lossy Image Compression	0028,2110	01
Modality LUT Sequence	0028,3000	Sequence Items <if subtracted image>
> LUT Descriptor	0028,3002	
> Modality LUT Type	0028,3004	
> LUT Data	0028,3006	
R Wave Pointer	0028,6040	<when available>
Mask Subtraction Sequence	0028,6100	Sequence Items <if subtracted image>
> Mask Operation	0028,6101	AVG_SUB
> Mask Frame Numbers	0028,6110	
Private Creator Data Element	0029,0010	CARDIO-D.R. 1.0
Private Data	0029,1000	Sequence Items [Edge Enhancement Sequence]
> Private Creator Data Element	0029,0010	CARDIO-D.R. 1.0
> Private Data	0029,1001	<Convolution Kernal Size>
> Private Data	0029,1002	<Convolution Kernal Coefficients>
> Private Data	0029,1003	<Edge Enhancement Gain>
Calibration Image	0050,0004	<no data entered by ACOM>
Curve Dimensions [in Curve D]	5000,0005	2
Number of Points [in Curve Data]	5000,0010	
Type of [Curve] Data	5000,0020	ECG
Axis Units [of Curve D]	5000,0030	
[Curve] Data Value Representation	5000,0103	
Minimum Coordinate Value	5000,0104	<no data entered by ACOM>
Maximum Coordinate Value	5000,0105	<no data entered by ACOM>
Curve Range	5000,0106	<no data entered by ACOM>
Curve Data Descriptor [Axis Specification]	5000,0110	
Coordinate Start Value [Starting Axis Value]	5000,0112	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Coordinate Step Value [Step Axis Value]	5000,0114	
Curve Data	5000,3000	
Pixel Data	7FE0,0010	Pixel Data Items
> Item	FFFE,E000	
> Sequence Delimitation Item	FFFE,E0DD	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

A1.4 Lossless Image Data

Attribute Name	Tag	Value
Group Length	0002,0000	
File Meta Information Version	0002,0001	
Media Storage SOP Class UID	0002,0002	1.2.840.10008.5.1.4.1.1.12.1
Media Storage SOP Instance UID	0002,0003	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Transfer Syntax UID	0002,0010	1.2.840.10008.1.2.4.70 (JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression)
Implementation Class UID	0002,0012	1.3.12.2.1107.5.4.3.2
Source Application Entity Title	0002,0016	SIEMENS:DCR 3.0
Specific Character Set	0008,0005	ISO_IR 100
Image Type	0008,0008	ORIGINAL\PRIMARY\SINGLE PLANE or ORIGINAL\PRIMARY\SINGLE PLANE\SINGLE A or ORIGINAL\PRIMARY\SINGLE PLANE\SINGLE B or ORIGINAL\PRIMARY\BIPLANE A or ORIGINAL\PRIMARY\BIPLANE B
SOP Class UID	0008,0016	1.2.840.10008.5.1.4.1.1.12.1
SOP Instance UID	0008,0018	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study Date	0008,0020	<yyyymmdd>
Image Date	0008,0023	<yyyymmdd>
Study Time	0008,0030	<hhmmss>
Image Time	0008,0033	<hhmmss>
Accession Number	0008,0050	
Modality	0008,0060	XA
Manufacturer	0008,0070	SIEMENS
Institution Name	0008,0080	<64 char max>
Institution Address	0008,0081	<no data entered by ACOM>
Referring Physician's Name	0008,0090	<no data entered by ACOM>
Study Description	0008,1030	<64 char max>
Performing Physician's Name	0008,1050	<16 char max>
Manufacturer's Model Name	0008,1090	HICOR/ACOM-TOP
Referenced Image Sequence	0008,1140	Sequence Items (if Image Type = BIPLANE A or BIPLANE B)
> Referenced SOP Class UID	0008,1150	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
> Referenced SOP Instance UID	0008,1155	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Private Creator Data Element	0009,0010	CARDIO-SMS 1.0
Private Data 1	0009,1002	Private data stream
Private Data 2	0009,1003	Private data stream
Private Data 3	0009,100a	Private data stream
Private Data 4	0009,100b	Private data stream
Patient's Name	0010,0010	<64 char max, "^" delimiter>
Patient ID	0010,0020	<64 char max>
Patient's Birth Date	0010,0030	<yyyymmdd>
Patient's Sex	0010,0040	<"M", "F", or "O">
Patient's Size	0010,1020	
Patient's Weight	0010,1030	
KVP	0018,0060	<no data entered by ACOM>
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	(e.g., VA30F 2000-11-05 21:00:31)
Frame Time	0018,1063	(ms)
Exposure	0018,1152	<no data entered by ACOM> (mAs)
Radiation Setting	0018,1155	GR
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Private Creator Data Element	0019,0010	CARDIO-D.R. 1.0
Private Data	0019,1030	
Study Instance UID	0020,000D	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Series Instance UID	0020,000E	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study ID	0020,0010	<16 char max>
Series Number	0020,0011	1
Image Number	0020,0013	<scene number>
Patient Orientation	0020,0020	<no data entered by ACOM>
Image Comments	0020,4000	<scene name>
Private Creator Data Element	0021,0010	CARDIO-D.R. 1.0
Private Data	0021,1013	<Image Sequence Number in the study, as stored on the medium>
Samples Per Pixel	0028,0002	1
Photometric Interpretation	0028,0004	MONOCHROME2
Number of Frames	0028,0008	<actual number of frames>
Frame Increment Pointer	0028,0009	
Rows	0028,0010	512

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Columns	0028,0011	512
Bits Allocated	0028,0100	8
Bits Stored	0028,0101	8
High Bit	0028,0102	7
Pixel Representation	0028,0103	0
Pixel Intensity Relationship	0028,1040	LIN (if native image) or LOG (if subtracted image)
Window Center	0028,1050	<if native image>
Window Width	0028,1051	<if native image>
Recommended Viewing Mode	0028,1090	NAT (if native image) or SUB (if subtracted image)
Lossy Image Compression	0028,2110	00
Modality LUT Sequence	0028,3000	Sequence Items <if Pixel Intensity Relationship = LOG>
> LUT Descriptor	0028,3002	
> Modality LUT Type	0028,3004	
> LUT Data	0028,3006	
R Wave Pointer	0028,6040	<when available>
Mask Subtraction Sequence	0028,6100	Sequence Items <if subtracted image>
> Mask Operation	0028,6101	AVG_SUB
> Mask Frame Numbers	0028,6110	
Private Creator Data Element	0029,0010	CARDIO-D.R. 1.0
Private Data Stream	0029,1000	Sequence Items
> Private Data	0029,0010	CARDIO-D.R. 1.0
> Private Data	0029,1001	
> Private Data	0029,1002	
> Private Data	0029,1003	
Calibration Image	0050,0004	<no data entered by ACOM>
Curve Dimensions [in Curve D]	5000,0005	2
Number of Points [in Curve Data]	5000,0010	
Type of [Curve] Data	5000,0020	ECG
Axis Units [of Curve D]	5000,0030	
[Curve] Data Value Representation	5000,0103	
Minimum Coordinate Value	5000,0104	<no data entered by ACOM>
Maximum Coordinate Value	5000,0105	<no data entered by ACOM>
Curve Range	5000,0106	<no data entered by ACOM>
Curve Data Descriptor [Axis Specification]	5000,0110	
Coordinate Start Value [Starting Axis Value]	5000,0112	
Coordinate Step Value [Step Axis Value]	5000,0114	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Curve Data	5000,3000	
Pixel Data	7FE0,0010	Pixel Data Items
> Item	FFFE,E000	
> Sequence Delimitation Item	FFFE,E0DD	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

A1.5 Report Files

Attribute Name	Tag	Value
Group Length	0002,0000	
File Meta Information Version	0002,0001	
Media Storage SOP Class UID	0002,0002	1.2.840.10008.5.1.4.1.1.12.1
Media Storage SOP Instance UID	0002,0003	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Transfer Syntax UID	0002,0010	1.2.840.10008.1.2.4.70 (JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression)
Implementation Class UID	0002,0012	1.3.12.2.1107.5.4.3.2
Source Application Entity Title	0002,0016	SIEMENS:DCR 3.0
Specific Character Set	0008,0005	ISO_IR 100
Image Type	0008,0008	DERIVED\PRIMARY\SINGLE PLANE or DERIVED\PRIMARY\SINGLE PLANE\SINGLE A or DERIVED\PRIMARY\SINGLE PLANE\SINGLE B or DERIVED\PRIMARY\BIPLANE A or DERIVED\PRIMARY\BIPLANE B
SOP Class UID	0008,0016	1.2.840.10008.5.1.4.1.1.12.1 (X-Ray Angiographic Image Storage)
SOP Instance UID	0008,0018	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study Date	0008,0020	<yyyymmdd>
Image Date	0008,0023	<yyyymmdd>
Study Time	0008,0030	<hhmmss>
Image Time	0008,0033	<hhmmss>
Accession Number	0008,0050	
Modality	0008,0060	XA
Manufacturer	0008,0070	SIEMENS
Institution Name	0008,0080	<64 char max>
Institution Address	0008,0081	<no data entered by ACOM>
Referring Physician's Name	0008,0090	<no data entered by ACOM>
Study Description	0008,1030	<64 char max>
Performing Physician's Name	0008,1050	<16 char max>
Manufacturer's Model Name	0008,1090	HICOR/ACOM-TOP
Private Creator Data Element	0009,0010	CARDIO-SMS 1.0
Private Data 1	0009,1002	Private data stream
Private Data 2	0009,1004	Private data stream
Private Data 3	0009,1006	Private data stream

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Private Data 4	0009,100a	Private data stream
Private Data 5	0009,100c	Private data stream
Patient's Name	0010,0010	<64 char max, "^" delimiter>
Patient ID	0010,0020	<64 char max>
Patient's Birth Date	0010,0030	<yyyymmdd>
Patient's Sex	0010,0040	<"M", "F", or "O">
Patient's Size	0010,1020	
Patient's Weight	0010,1030	
KVP	0018,0060	<no data entered by ACOM>
Device Serial Number	0018,1000	
Software Version(s)	0018,1020	(e.g., VA30F 2000-11-05 21:00:31)
Exposure	0018,1152	<no data entered by ACOM> (mAs)
Radiation Setting	0018,1155	GR
Positioner Motion	0018,1500	STATIC
Positioner Primary Angle	0018,1510	<depending upon HICOR configuration> (degrees)
Positioner Secondary Angle	0018,1511	<depending upon HICOR configuration> (degrees)
Study Instance UID	0020,000D	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Series Instance UID	0020,000E	1.3.12.2.1107.5.4.3.<system_id>.<yyyymmdd>.<hhmmss>.<N>
Study ID	0020,0010	<16 char max>
Series Number	0020,0011	1
Image Number	0020,0013	<report number>
Patient Orientation	0020,0020	<no data entered by ACOM>
Image Comments	0020,4000	<scene name>
Samples Per Pixel	0028,0002	1
Photometric Interpretation	0028,0004	MONOCHROME2
Number of Frames	0028,0008	1
Rows	0028,0010	512
Columns	0028,0011	512
Bits Allocated	0028,0100	8
Bits Stored	0028,0101	8
High Bit	0028,0102	7
Pixel Representation	0028,0103	0
Pixel Intensity Relationship	0028,1040	DISP
Window Center	0028,1050	
Window Width	0028,1051	
Recommended Viewing Mode	0028,1090	NAT

Note: The Value field in the above table is optional, as such, blank spaces are allowed.

Private Creator Data Element	0029,0010	CARDIO-SMS 1.0
Private Data	0029,1080	Sequence Items
> Private Creator Data Element	0029,0010	CARDIO-SMS 1.0
> Private Data	Multiple Tags	<Private Elements>
Calibration Image	0050,0004	<no data entered by ACOM>
Pixel Data	7FE0,0010	Pixel Data Items
> Item	FFFE,E000	Item Elements
> Sequence Delimitation Item	FFFE,E0DD	

Note: The Value field in the above table is optional, as such, blank spaces are allowed.